SHORT COMMUNICATIONS

OCCURRENCE OF THE COPEPOD PARASITE *LERNAEA CYPRINACEA* L., ON THE AUSTRALIAN GRAYLING, *PROTOTROCTES MARAENA* GÜNTHER

The Australian grayling *Prototroctes maraena* is the only extent member of the family Prototroctidae (McDowall 1976); the only other species, *P. oxyrhynchus*, is presumed to be extinct (McDowall 1976). Although the actual status of *P. maraena* within southeastern Australia remains uncertain (Bell *et al.* 1980), it is evident that existing populations are scarce. This situation has existed for over 100 years (McDowall 1976) and is undoubtedly responsible for the scant knowledge regarding the life history of the species. Recent contributions by Jackson (1976) and Bishop & Bell (1978) have elucidated many aspects of the biology of *P. maraena*, but to date there have been no reports relating to parasites on this species (Beumer *et al.* 1982). In this paper I report the discovery of the anchor worm *Lernaea cyprinacea* on specimens of *P. maraena* taken from the Tambo River in Gippsland, eastern Victoria.

MATERIALS AND METHODS

Specimens of *P. maraena* were collected from the Tambo River in the vicinity of Playgrounds Road bridge during May, 1982. The fish were taken from a 200 m section of the river by rotenone poisoning. Caudal fork lengths (LCF) of all specimens taken were measured to the nearest millimetre and sex determination made by macroscopic examination of the gonads. Specimens were frozen and returned to the laboratory within one week.

Examination by eye enabled the number of transformed female *L. cyprinacea* (see Nakai 1927) together with their respective positions on each fish to be determined and recorded. The number and position of lesions were also recorded as they indicate either those areas of penetration where the females are not visible by macroscopic examination, or those areas from which the parasite had recently been dislodged (Robinson 1982). The gills of each fish were rinsed in 10% formalin and examined for non-transformed life stages of the parasite. All other fishes taken were examined in the same way for both transformed and non-transformed copepod life stages.

RESULTS

Of 9 (7 males and 2 females) specimens of *P. maraena* collected, with a size range of 117 to 231 mm length, three carried transformed female *Lernaea* and/or lesions. A female 231 mm long had one *Lernaea* and a lesion near the base of the dorsal fin and another lesion on the body dorsal to the lateral line. A male 207 mm long had 3 *Lernaea* on the dorsal fin and 2 *Lernaea* as well as a separate lesion dorsally on the body. Another male 117 mm long had a single lesion on the dorsal fin. A total of 6 transformed *L. cyprinacea* were found ranging in length from 8.5 to 12.5 mm (Mean = 10.6; SD = 1.57). Five of the specimens possessed egg sacs containing many well developed eggs. An examination of the gills of the grayling specimens failed to reveal any non-transformed life stages of the parasite.

Other fish species taken were tupong, *Pseudaphritis urvilli* (Cuvier & Valenciennes) (n = 2, LCF 79-208 mm), Australian smelt, *Retropinna semoni* (Weber) (n = 37, LCF 33-67 mm) and the common galaxiid, *Galaxias maculatus* (Jenyns) (n = 40, LCF 79-122 mm). Examination of these fishes showed a total absence of all life stages of the parasite.

The water temperature ranged from 8.5 to 11.0°C during the two week period prior to sampling—conforming with the pattern from historical records for nearby Ramrod Creek kept by the State Rivers and Water Supply Commission of Victoria, Melbourne.

DISCUSSION

Lernaea cyprinacea is capable of causing considerable losses to fish populations, particularly in intensive culture ponds (Lahav & Sarig 1964, Lahav *et al.* 1964, Meyer 1966). Levels of infection in flowing streams are significantly lower as a result of water movement (Bulow *et al.* 1979). The potential for heavy infections of *L. cyprinacea* during the spawning activity of *Prototroctes maraena* in late autumn (B. R. Tunbridge pers. comm.) seems unlikely. The life cycle of *L. cyprinacea* is highly dependent on temperature (Nakai & Kokai 1931, Shields & Tidd 1968) with the strain present in Australia requiring a temperature of 24°C to complete its life cycle (Robinson 1982). Daily temperatures in the Tambo River during the period in which the grayling spawn rarely exceed 15°C—which is insufficient for the hatching and transmission of parasite larvae to occur. The parasite specimens found during this study presumably constitute the over-wintering population (*sensu* Nakai & Kokai 1931). Further evidence for this assumption is provided by the absence of non-transformed parasites on the gills of the grayling.

The location of spawning of *P. maraena* has long been a matter of conjecture. Johnston (1891) and Lord & Scott (1924) promulgated the view that grayling migrate downstream to brackish water to spawn, whilst Bishop & Bell (1978) suggested that the species spawns in freshwater. *L. cyprinacea* may now provide an intermediate in determining the location of spawning for grayling. Shields & Sperber (1968) found that the posterior region of the parasite, including the egg sacs, is susceptible to the osmotic concentration of the external medium and that eggs exposed to salinities greater than 3 ppt became malformed or amorphous. As the over-wintering parasite population in the Tambo River possess egg sacs, future observations on the state of the eggs on parasites infesting spent grayling would be useful in determining the spawning area of *P. maraena*. Malformed eggs on *L. cyprinacea* infesting spent grayling would indicate that the fish had been in brackish water, whereas normal well-developed eggs on the parasite would suggest that the grayling had spawned in freshwater.

This is the first time *L. cyprinacea* has been reported south of the Great Dividing Range in Victoria and represents a significant transition for the parasite into relatively cooler coastal waters.

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